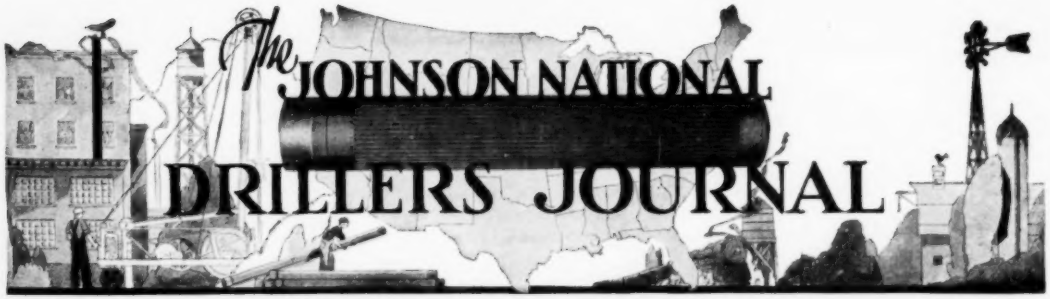


Vol. 22, No. 1 THE JOHNSON NATIONAL DRILLERS' JOURNAL Jan.-Feb., 1950

GROUND WATER RESOURCES AND THEIR CONSERVATION

TESTING WELLS

Efficiency Tests

The testing of a completed pumping unit is often required before the job will be accepted. Tests of this kind are not hard to make if one has a good understanding of pumps and their characteristics, also just what determinations have to be made to calculate efficiency.

In addition to the measurements for quantity and total head, the power used in doing the job must be determined. Most engineers and a few pump representatives and well drillers are qualified to make such tests, as special equipment is usually required and also considerable experience in using such equipment.

After the total head in feet has been determined, the next job is to ascertain the actual horsepower used to pump a given quantity of water against this head. The total lift or head is divided into two parts, the head or lift below the pump, and the head above the pump. In other words, the total head against which a pump operates is the actual distance in feet from the pumping level in the well to highest level that the pump will raise the quantity of water being pumped. In this vertical distance all friction and velocity head losses in the discharge line are included.

The lift below the pump can be determined by any of the methods previously described. The lift above the pump can be measured in feet with friction and velocity head losses added, to obtain the total head above the pump, or it can be read directly by using a pressure gauge. All readings are converted into feet as horsepower is made up of foot pounds. It might be said that friction and velocity head losses are oftentimes neglected or disregarded as they are relatively small when compared with the total head, furthermore, they are not easily determined in the field. In important tests or tests made in a laboratory they are always included.

This is the time of year when most drillers take stock, repair equipment, and begin to think about new work for the coming season.

It is also the time for holding well drillers' meetings. These are very important and even though it may not always be convenient, we suggest that an effort be made to attend the drillers' meetings.

Important developments are in store for drillers in many of our states and attendance at meetings where these developments are discussed gives every one a chance to have his say.

The Journal looks forward to a good year for well drillers in 1950.

In making pump tests the unit of horsepower mentioned above is always used for measuring power. It represents the work done in raising 550 pounds 1 foot in 1 second. This is equivalent to 33,000 foot pounds per minute. It is also equal to 2,545 B.T.U's per hour or 745.7 watts of electrical energy. Thus the horsepower actually required to raise a given quantity of water, a given number of feet in a given length of time is nothing more or less than the weight of the water multiplied by the feet it is lifted and then divided by the number of foot pounds in a horsepower. Water weighs about 8.34 pounds per gallon depending on its temperature or density and a formula for water horsepower is

$$\text{W. H. P. is} = \frac{\text{Weight} \times \text{Total Head.}}{3300}$$

This formula can be made in terms of gallons per minute by re-writing as follows:

$$\text{W.H.P.} = \frac{\text{G.P.M.} \times \text{Total Head.}}{3960}$$

The figure obtained for W.H.P. is of course theoretical and would be the horsepower required if the pump and power unit were 100% efficient mechanically. Unfortunately we do not have such pumps and engines available; they vary in efficiency over a wide range depending on their type and manufacture. For this reason the efficiency of both the pump and the power unit will enter into and determine our figures for overall efficiency.

The measurement of power naturally depends on the kind of

(Continued on Page 2)

(Continued from Page 1

power being used and how much of it is applied or transmitted to the pump shaft. If the power is being transmitted to the pump through a belt or flexible coupling shaft, the actual power being delivered to the pump can be measured by a prony brake or read from a dynamometer. If a prony brake, the formula for brake horsepower (B.H.P.) is $\frac{2\ \pi\ LWN}{33{,}000}$; "L" being the length of the lever arm, "N" the number of revolutions per minute, "W" the weight in pounds on the lever and "π" being 3.1416. Whenever the number of revolutions is involved, a revolution counter or tachometer should be used with a stop watch.

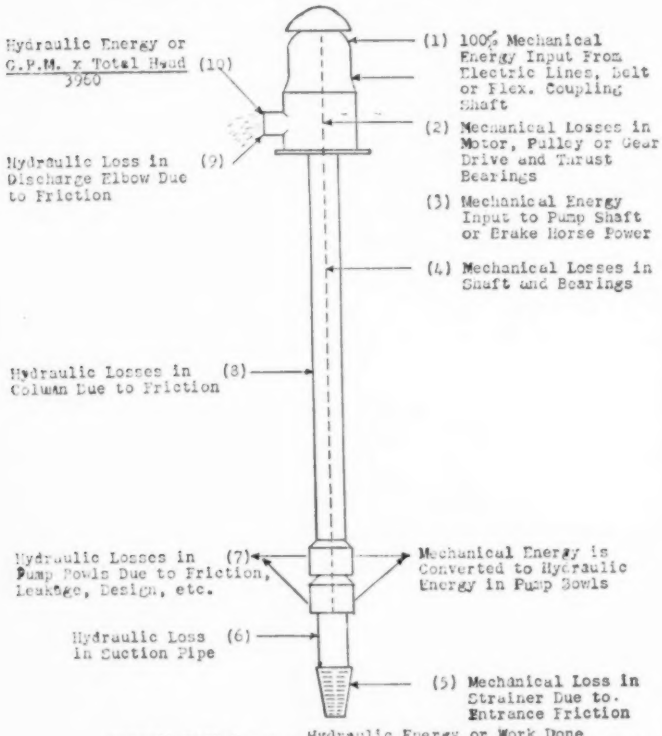
When electrical horsepower (E.H.P.) is used, the number of kilowatts input to the motor in a given length of time is determined and then divided by 0.7457 to get the equivalent horsepower being delivered to the motor. This sounds easy but the catch is the determination of the electrical input accurately. This can be done by measuring the kilowatt input with a watt meter. If the actual horsepower output of the motor on the motor shaft is wanted, this is the brake horsepower (B.H.P.) of the motor. It can be approximated by multiplying the kilowatt input by the motor manufacturer's guaranteed motor efficiency. If there should be any question about the motor efficiency, it can be determined measuring the mechanical output of the motor by means of a prony brake or otherwise. For direct calculation of horsepower input from a meter reading the formula is $\frac{4.83 \times K \times R}{t}$, where K is a constant representing the number of watt hours through the meter for one revolution of the disc. This constant is found on the face of the meter or its nameplate. R is the number of revolutions in "t" seconds of time. A stop watch must be used accurately to obtain the number of revolutions in a given length of time.

If the speed of the motor has been checked and the E.H.P. input to the motor determined, this will be sufficient information to check the operation of the motor and figure its efficiency. Most manufacturers of motors have compact testing outfits which are available to check their equipment. The pump manufacturers also have calibrated equipment of various kinds to measure water being pumped.

When the power is being furnished by an engine, motor, or steam turbine, through a belt or coupling shaft, the problem of testing for overall efficiency becomes more complicated as the use of power in this manner may result in considerable losses in transmission to the pump.

The horsepower a belt will transmit depends primarily on the speed, width, and thickness of the belt and how nearly it comes to being the most efficient belt for the work to be done. Simple formulas are available to check the pulley diameters and speeds of belts regardless of the power unit being used. The formulas are not the same for V belts as they are for flat belts. The horsepower that a belt will transmit can be calculated by the formula H.P. $= \frac{S \times D \times N \times W}{132{,}000}$, where "S" is the effective pull of the belt in pounds per inch of width. This pull can be estimated at 65 to 70 pounds per inch of width for belt speeds up to 3,000 feet per minute. For belt speeds of 5,000 feet per minute, the effective pull can be estimated at 50 to 65 pounds. "W" is the width of the belt in inches, "D" the diameter of the driving pulley, and "N" the number of revolutions per minute. By using this same rule, the width of belt re-

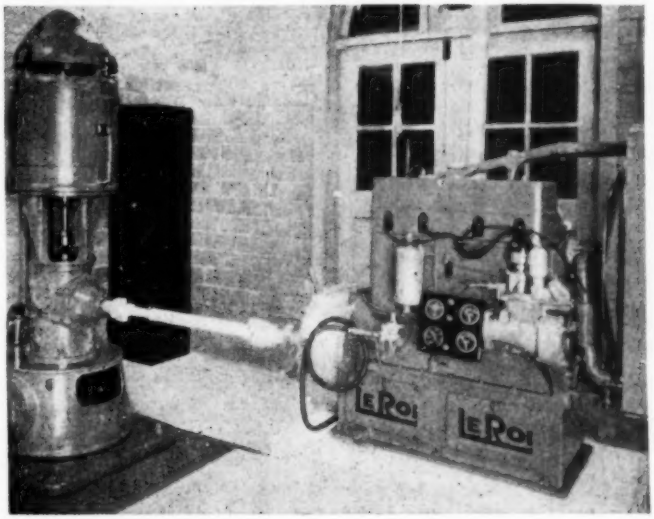
POWER USE IN A DEEP WELL TURBINE PUMP


Hydraulic Energy or G.P.M. x Total Head / 3960 (10)
(1) 100% Mechanical Energy Input From Electric Lines, Belt or Flex. Coupling Shaft
(2) Mechanical Losses in Motor, Pulley or Gear Drive and Thrust Bearings
Hydraulic Loss in Discharge Elbow Due to Friction (9)
(3) Mechanical Energy Input to Pump Shaft or Brake Horse Power
(4) Mechanical Losses in Shaft and Bearings
Hydraulic Losses in Column Due to Friction (8)
Hydraulic Losses in Pump Bowls Due to Friction, Leakage, Design, etc. (7)
Mechanical Energy is Converted to Hydraulic Energy in Pump Bowls
Hydraulic Loss in Suction Pipe (6)
(5) Mechanical Loss in Strainer Due to Entrance Friction

Overall Efficiency (Wire to Water) = Hydraulic Energy or Work Done / Mechanical Energy or Power Required

Includes All Losses in Driving and Pumping Unit

quired can be calculated as "W"= H.P. x 132,000.
———————— A simple rule for
S x D x N
belt width is the number of plies multiplied by the width in inches and by the pulley width in inches, by the number of revolutions per minute and then divide the product by 12,000. There are other tricks to setting up a belt driven job such as having a belt of the proper length and having the pulleys lined up right. The length of belt can be checked by the following formula: $L=\frac{3.1416(D-d)}{2}+2C$, where "D" is the diameter of the driving pulley, "d" the diameter of the driven pulley, and "C" is the distance between shafts. When using belts with a quarter turn, it is essential to have the pulleys lined up properly, otherwise the belt will not stay on them at all. The following table will be of assistance in selecting belt widths and lengths:



A deep well turbine pump with direct drive through electric motor or gasoline engine drive through a flexible coupling shaft.

BELT SPECIFICATIONS

Where it is desired to operate a deep well turbine by means of a belt the fact that one shaft is horizontal and the other vertical necessitates the use of a quarter turn in the belt. This also means that the driving pulley must be lined up carefully with respect to the driven pulley or the belt will not stay on. The illustration shows how the pulleys should be aligned and spaced for quarter turn drive. V-belts take different alignments.

	Leather Belts		Rubber Belts		Minimum Centers "A"	
H.P.	Width	Ply	Width	Ply	Motor Drive	Engine Drive
10	4"	1	5"	3	10 Ft.	15 Ft.
15	5"	2	5"	4	12 Ft.	18 Ft.
20	6"	2	6"	4	14 Ft.	22 Ft.
30	8"	2	8"	5	16 Ft.	25 Ft.
50	10"	2	10"	5	18 Ft.	30 Ft.
75	12"	2	12"	5	20 Ft.	34 Ft.
125	16"	2	16"	6	24 Ft.	37 Ft.
175	20"	2	24"	6	27 Ft.	40 Ft.
225	24"	3	30"	7	30 Ft.	42 Ft.
300	30"	3	*		32 Ft.	43 Ft.
400	36"	3	*		35 Ft.	45 Ft.

MINIMUM RECOMMENDED PULLEY DIAMETERS:

For Single Ply Leather Belts 5" Diameter.
For Double Ply Leather Belts 7" Diameter.
For Triple Ply Leather Belts 14" Diameter.
For Three Ply Rubber Belts 6" Diameter.
For Four Ply Rubber Belts 7" Diameter.
For Five Ply Rubber Belts 10" Diameter.
For Six Ply Rubber Belts 12" Diameter.
For Seven Ply Rubber Belts 14" Diameter.

*Rubber Belting Not Recommended.

Above ratings are based on 4,500 ft. per min. belt speed. For lower speeds reduce ratings for any given width of belt in direct proportion to reduction in speed. To allow for belt sag, drop the center of the face of driven pulley below the top edge of driving pulley $\frac{3}{4}$" for each foot of center to center distance, as shown at "B."

When the power unit is an internal combustion engine, steam turbine, the problem of ascertaining overall efficiency of a pumping unit becomes more complicated than ever, as the actual brake horsepower of the driving unit must be determined and this is not always easy to do. Steam turbines, while seldom used in testing newly installed installations, are frequently found as prime movers on permanent installations. They are available in all sizes as far as horsepower is concerned and are designed to use ordinary steam pressures and temperatures. If necessary to test an installation driven by a steam turbine, the steam consumption and speed of the turbine are the principal factors. The efficiency of steam turbines under good operating conditions varies from 65 to 80 per cent.

Internal combustion engines are being more generally used to drive pumping equipment than they were even a few years ago. This is due, no doubt, to the saving in fuel costs, general reliability and the fact that in many pump irrigated areas electric current is not available. Diesel types of engines are favored whenever possible, though both gasoline and gas engines are used. To determine the horsepower output and efficiency of such engines, it is necessary to carefully measure the power developed with a given amount of fuel at a certain speed and compare it with the power required at full load. For overall efficiency the water load and pump efficiency enter the calculations and the whole job requires considerable experience and knowledge of such equipment.

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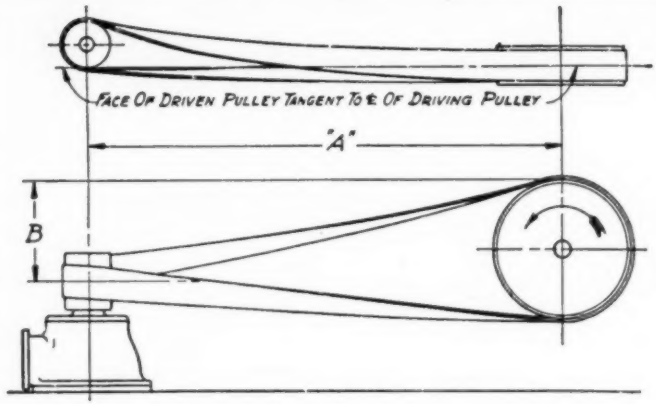
Parker A. Hingley, a driller in Truro, Nova Scotia, drilled the well shown for the Town of Truro. It is an 8-inch well 240-feet deep producing 300 Imperial Gallons per Minute.

Ground Water Resources and Their Conservation

(Continued from Page 3)

While direct connected driving units are always desirable on pumping units, there are many cases where this is impossible or impractical on account of the type of power units available. In such cases, the power unit can be connected to the pump by means of a flexible coupling shaft and when the pump has a vertical shaft a right angle geared driving head must be used on the pump. The best makes of right angle gear drives will operate at 95% of minimum efficiency, provided they are correctly designed and installed and not overloaded. The efficiency of such equipment is reduced if not operated at the maximum horsepower rating. Naturally when making an important or official test of a complete pumping unit, the efficiency of the geared head (if used) must be determined and taken into consideration in the calculations for overall efficiency.

According to Carl Rohwer, Irrigation Engineer, U. S. Department of Agriculture, Circular No. 678, the fuel consumption per horsepower at sea level with the air temperature at 60°F. with engine completely equipped and loaded is:



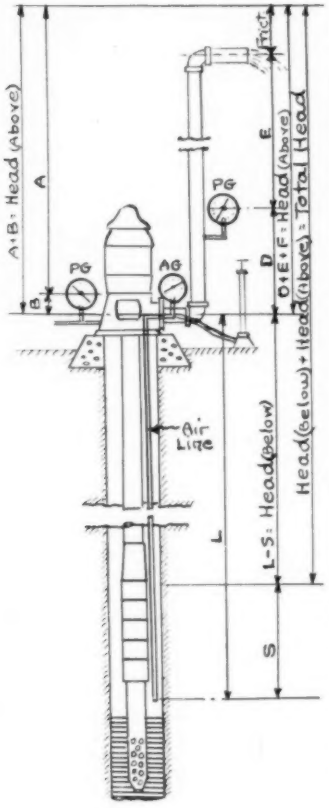
Fuel	Weight per Gal. Pounds	Fuel required per Pounds	Gals.	B.H.P. Hour Cu. Feet
Gasoline	6.0-6.3	0.60-0.64	0.10	.....
Kerosene	6.8	0.72-0.75	0.09	.....
Distillate	7.0	0.72-0.75	0.095	.....
Fuel Oil	7.0-7.6	0.48-0.50	0.07	.....
Butane Liquid	4.7-4.8	0.41-0.51	0.10	.....
Gas	.....	.....	.....	3.0
Natural Gas	.....	.....	.....	12.5
Mfgd. Gas	.....	.....	.....	15.0

All fuels for internal combustion engines should be pure and free of foreign material, excessive amounts of sulphur, and carbon. Only fuels with the proper Baume rating for the particular engine envolved should be used. The higher the Baume rating, the lighter the fuel. When gas is used as a fuel, the power developed is a function of the heating value or B.T.U.'s of the gas. Internal combustion engines will not last long if they are overloaded, but if treated right will give as good if not better service and are cheaper than any other type of power.

In addition to the technical data and information required to make a field test of overall officiency, all parties concerned should know something of the design of various types and their operating characteristics. Pumps not only operate differently but they are temperamental as well. For this reason it is well to know how to operate and control them. The control of electric motors usually starts with the closing of an electric circuit. This is done in a number of different ways depending on whether the unit is manually operated or operated by devices such as pressure or float switches at some point distant from the motor. The load of the motor coming onto the power line must be such that it will not throw the line out of commission temporarily. For this reason most power companies have regulations governing the load that can be thrown "across the line" by closing a starting switch. Whenever the load is excessive, then special control equipment is required. Naturally where line conditions will permit, it is simpler and cheaper to use "across the line" starters. However, when the load is too heavy, then reduced voltage starters must be used which will allow the motor to build up to full power gradually. Both types of starters

(Continued on Page 5)

Testing a 10-inch well at Fessenden, North Dakota, built by C. A. Simpson & Son. Well 200 g.p.m. on test using 17 feet of screen.



MEASUREMENT OF HEAD ON DEEP WELL TURBINE

A simple way to measure the Head (above) is shown on the left side. A pressure gauge (PG) will measure all of the head losses and lift above it (A) and indicate the total pressure required to overcome these losses and lift. B is the distance from center of gauge to center of discharge; therefore, the Head (above) is A + B.

To measure Head (below) an altitude gauge and air line (AG) are used. The reading on the gauge after it has been pumped to a steady reading indicates the submergence (S) over the lower end of the air line (L). This distance is subtracted from the length of the air line (L) and gives the lift or Head (below) the center of the pump discharge. L — S = Head (below).

The Total Head is the sum of the Head (above) and the Head (below).

The Head (above) can be measured by using a pressure gauge PG, converting pounds into feet the reading E plus the distance D, plus friction loss in the elbow. The Total Head is therefore the Head (below) plus the Head (above).

(Continued from Page 4)

can be activated either manually or by remote control. Most electric control apparatus also has protection against low voltage in case of power failure and high voltage such as lightning, shorts, etc. It should be remembered that electric control apparatus is not designed nor intended to be used as circuit breakers, fuses, etc. but is intended to control the starting and running load under operating conditions. Protective devices should always be used and placed ahead of the control equipment on the power line. The control of engines, steam turbines, and such types of prime movers depends entirely on the dead load of the pump and power required to move it. Usually clutches, gear transmissions, throttles, or something of that kind is used.

In addition to knowledge of the control of the prime movers themselves, something should be known of the pressure and water level control apparatus used to start prime movers, either by closing electric circuits or by the application or release of pressure. In fact, the entire matter of controlling heavy pumping equipment requires careful consideration not only from the standpoint of starting an idle pump but also of handling the water being pumped and controlling the water pressures in the pump while running.

To sum up the subject of testing pumping units, consisting of wells equipped with pumps, it is always well to consider the purpose and importance of the test to be made, the specifications covering the test and the people who are going to make the test. No one's equipment or completed well should be condemned on account of some one's inability to properly test it. Many times more time is wasted and more equipment is supplied than the job requires. It is well to approach all testing in a spirit of cooperation rather than an attempt to show up some one's faults and short comings. No manufacturer or well driller wants more than he is entitled to and by the same token he wants all he is entitled to.

The following simple formulas will help in any job of testing as they set out the three basic things that must be determined to arrive at overall efficiency.

(1) Water Horsepower (W.H.P.) $= \frac{\text{G.P.M. x Head in Feet}}{3960}$

This is the theoretical power required to pump a given number of gallons per minute against a certain head at 100% efficiency.

(2) Brake Horsepower (B.H.P.), this is determined either by test or accepting the manufacturer's guarantee of power output on the shaft of the driving or driven apparatus. It is the relation or ratio of

(Continued on Page 6)

Testing a 14-inch well in the Everglades in Florida built by the Kiser Drilling Company of Miami for the Department of Water and Sewers. The output was measured at 3,500 g.p.m.

Ground Water Resources and Their Conservation

(Continued from Page 5)

power input to the actual power output on a shaft.

(3) Overall Efficiency = $\frac{\text{W.H.P.}}{\text{B.H.P.}}$ or the work done divided by the power required to do it. This is the overall efficiency of the installation, though it may be necessary to determine the efficiency of the pump and the driving unit separately in order to arrive at the total amount of power required in terms of horsepower. The cost of pumping water in kilowatt hours per 1,000 gallons is the total head in feet multiplied by 0.314 and then divided by the overall efficiency.

IS THERE A WATER SHORTAGE?

Recently there has been much publicity regarding water shortages and as a result many are wondering just what the situation is.

No doubt the serious shortage in New York City has caused a great deal of speculation and also hardship on the public. However, this shortage is only temporary and will be corrected in time. What are the facts then, when we hear of geologists and other experts predicting a general water shortage?

The answer is that a careful study of the situation indicates a definite shortage, particularly of ground water in certain metropolitan areas, portions of the Middle, Southwest, and in the Far East, due principally to overpumping for industry and irrigation. In these areas there has been a definite lowering of the water table sufficient to render some developments useless and to bring on regulatory measures regarding future developments and use of ground water.

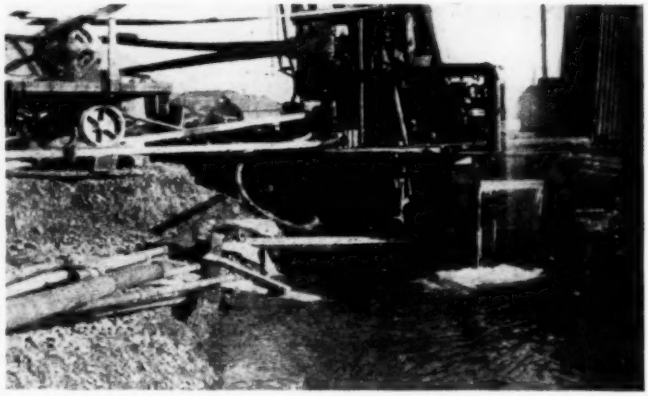
In the largest part of the country there has been the usual seasonal fluctuations of the water table but no general shortage. The fact still remains that there is more water stored in our ground water reservoirs than there is in our surface reservoirs both natural and artificial. The problem is to develop and use this water in accordance with its value.

This means conservation of ground water and where there are excessive demands for it, regulation of the amount anyone can take for various purposes.

Actually there is no need for the general public to become alarmed as ground water is replaced annually. It may be necessary to institute conservation measures both by states and locally but there will still be water enough for everyone. There may have to be co-operation between states and even communities but this will come as the necessity arises.

One thing that can be done which will relieve the situation in many cases is the construction of better wells, properly located to develop the water available, and pumped at rates which will insure their life over a period of years.

As we see it, there is no occasion for general alarm or fear of a ground water shortage.



A typical setup for testing either well pump or complete installation by means of a motor and quarter turn flat belt.

Municipal well at Pepin, Wisconsin, being tested at rate of 310 g.p.m. with 13-foot drawdown.

—o—

Visitor at Navy Yard—"So you are on a submarine. What are your duties?"

Sailor (fed up)—"Oh, when we want to dive, I run forward and hold its nose."

—Winnipeg Tribune.

NEW MANAGER

Mr. Thomas M. Carroll who has been Manager of the Water Well Drillers Association of Southern California for several years resigned as of December 31, 1949.

He has been succeeded by Mr. Meredith V. Polley, formerly with the Seaside Oil Co. as District Sales Manager and is thoroughly familiar with the well drilling problems of Central and Southern California.

IOWA-GOPHER DRILLERS FORM NEW ORGANIZATION

The Southern Minnesota and Northern Iowa Group Meeting of Drillers will hold their fourth meeting, Sunday, January 29, 1950, at Owatonna, Minnesota.

This group was organized at their first meeting in Albert Lea last summer to enable drillers to discuss mutual problems pertinent to the well drilling industry. The drillers feel that by meeting every 30 to 60 days they can become better acquainted and discuss problems at greater length than time affords at annual conventions.

At the third meeting held December 9th in Albert Lea, the following permanent officers were elected: Kenneth Hamman, Owatonna, Minnesota, President; Guy Beemer, Lakota, Iowa, Vice-President; and Ervin Halverson, Rake, Iowa, Secretary-Treasurer.

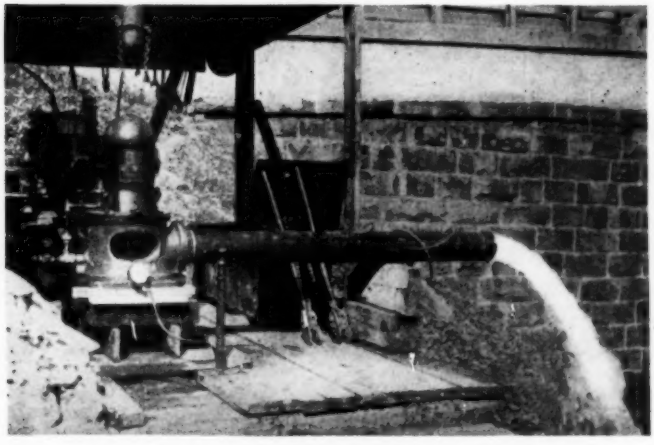
W. D. Brown & Sons operate a complete well drilling and pump service at Hamilton, New Zealand. The view shows their shops, garage, drilling rigs, and service trucks.

MINNESOTA HOLDS CONFERENCE ON UNDERGROUND WATERS

Governor Luther W. Youngdahl called a meeting to be held at the State Office Building at St. Paul, Minnesota, February 2, for the purpose of discussing underground water supply problems of critical importance to Minnesota communities, industries, and general public.

The meeting was called to order by Chester S. Wilson, Commissioner of Conservation, acting as Chairman. Mr. S. A. Frellsen, Director, Division of Waters, Department of Conservation, stated the objectives of this meeting. Various aspects of underground waters were discussed by George M. Schwartz, Director, Minnesota Geological Survey; A. F. Meyer, Consultant Hydraulic Engineer, with the legal and sanitary aspects taken up by officers from those departments. Mr. A. G. Fiedler, Assistant Chief, Ground Water Branch, U. S. Geological Survey, Washington, D. C., spoke on "Legal and Economic Aspects of Ground Water Investigations in North Central States."

The meeting closed following discussions by representatives of engineering societies and well drillers' associations of the progress of underground water use in Minnesota.



A typical setup for testing using a gasoline engine driving the pump through a flexible coupling shaft and right angle geared head.

The theatrical producer approached a critic who had panned his show.

Producer—"You were very severe on my play. What was so bad about it?"

Critic—"I didn't like the way the lights were handled."

Producer—"What was wrong about them?"

Critic—"They were on."

—Pictorial Review.

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TOM'S COLUMN

Dear Fellows:

Well, as the highbrows would say, this here winter has had its moments. Funny freaks of weather are sometimes a little aggravatin'. We were out on a job a few days ago thinkin' we had a nice, balmy 30 above and was goin' along good when she changed and we had a 40 degree drop before we knowed it. Then the wind comes up and a sleet blizzard fouled us up, the rig slid into a ditch when we tried to move her outa there, and you can bet your dough we did a better job of all out cussin' than we did of drillin'. It's times like that when I miss ol' Swig McGrew because that old goat had the fanciest line of cussin' you ever bent an ear to. The boys usta listen in a sort of rapture when old Swig broke loose an' that got your mind off the trouble fer awhile. As one of the boys said, it was poetry the way old Swig handled it, and the way he could mix up the cussin' with his expert tobacco juice spittin' was worth the chips. Guess every part of the country has been havin' a touch of this freak stuff—seems like the weather aint as dependable as it was in the old days or maybe us old-timers aint so good on remembering. Anyway, I'm gettin' to the stage where I can't stand the old gaff. Used to think a man was pretty soft who couldn't take it as it come but now I kinda like to look fer an easy out myself when the goin' gets tough.

The boy and me was talkin' with an old farmer last week and he had quite a tale of woe. Seems he took up this land way back in the homestead days so he cleared and proved up on it, built a rough house an' barn on it practically all by himself. After some back breakin' years he had a fair size farm an' by addin' to it through the stretch of time he now has about 600 acres. Way back in the early days he says he got his water by the pail from a brook near his place. They did their washin' in a wash basin—and the family wash in a wooden tub. There was the usual rain barrel outside the shack then a cistern they dug, an' finally they sunk a bucket well.

All this time their water needs was simple, a few animals an' the family. Of course as the place grew they found they had to find more ways of gettin' more water because as new fangled ideas come along they discovered as everybody else has that there aint no progress that don't call fer more water supply. When they got around to havin' their first well drilled they did what maybe 90 per cent of 'em used to do, finished the well open end. We all know this kind of a well can serve a purpose at least fer awhile, but as more and more water is needed they're bound to bump into trouble. This farmer told us how his family wanted more fancy things like septic tanks and indoor plumbing, and **that** took more water. He tried puttin' in a couple more wells to help out his growin' problems, but these was also finished open end. "Course all of us know that sand accumulates in these open end wells, and he says they'd go down with the bail-

(Continued on Page 9)

Colorado
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er and clean it out, but the more water he needed the more trouble he was havin' tryin' to maintain his supply. His real trouble came he says when this REA program came along an' they was able to get electricity. Like every farmer who manages to get electricity fer operatin' his layout he went all out fer usin' it fer everything he could. They went to swabbin the barn floor, washin' the cars and trucks, and a dozen other new ways of usin' water but the old wells wasn't up to deliverin' all that was needed. He tried installin' jet pumps but sand got into the pumps an' of course they lost their prime.

As the boy was sayin' to me afterwards, here's a man who built up a prosperous farm after years of hard work without ever findin' out how important it is to build wells right. Now it's costin' him more tryin' to make his equipment work than it would have cost to put in the job right in the first place.

I told the farmer that now when he's got electricity and all this new uses fer water his open end wells just won't do the work. From what I calculate from what he tells me about his needs, he'll need a 6-inch well where he's been tryin' to get by on a 2-inch well. He goes to all the expense of buyin' milkin' machines, he's got 80 cows fer milkin', the well quits, which throws the coolin' system out of kilter besides there bein' no water fer 100 animals. He has to go ten miles fer to find an electrician to fix up the mess he found himself in—and then blames the well fer his trouble. The losses he took on milk alone, after a stoppage like that, would pay fer a standby plant fer emergencies. I told him that any farmer who is dependin' on electricity entirely sure needs a standby—or should be in shape to get service awful quick. But in his case, the real trouble started because he took on all the improvements that goes with the use of electricity without improvin' his wells so they could handle the load.

I aint sayin' that this farmer is all to blame fer the situation. Come right down to it he bought a well and figgered the driller would know what was needed to supply him with water. As I say, a lot of us have put in open end wells—but we ought to know they're gonna make trouble sooner or later. The boy was sayin' that us drillers aint fully aware of what this great extension of electricity is doin' to our business. It's changin' the whole picture in the farm districts where they can get it. No matter how they go about it—the more electricity is bein' put to use, the more water they're gonna need. Some of the up-to-date drillers are already on the job and they're addin' a new type of service to their customers. They're on call, and they have supplies of spare parts. Some of 'em are now handling softeners, pumps, pump supplies, even hot water heaters and barn supplies. All of these things tie right in with modern well drillin' because there aint a dang one of 'em will be worth a whoop to a farmer if the water supply aint there. So me and the boy figgers there's a lot we can do if we got the gumption to do it—drillers today must gear themselves to meet the new service problem that's gonna grow with the spread of electricity.

I figger I was givin' this farmer good advice when I told him most of his trouble is caused by his wells bein' finished open end. He will have to do something to remedy that before he can deal with any of the other problems he thinks he has since electricity has come to his farm. If us drillers want to keep pace with what's goin' on in a fast movin' age we gotta be able to advise people about their water supply. We can't do it if we don't keep ourselves hep to the modern ways of progress. This farmer I'm talkin' about is learning the hard way that gettin' water—I mean water adequate fer his needs, aint just a matter of diggin' a well like he thought. It should have just as much careful technical study as the machines he buys and other things—none of which are gonna do him a bit of good if his water wells fail.

The Mrs. is gonna make me eat meat balls and this here spagetty whether I like it or not an' the grub is bein' put on the table, so I guess I'll shove up and grab myself a plate. Hope the new year is startin' off well fer all of you.

Yours truly,

TOM.

Water is valuable in Texas and a supply like the one shown in the picture is not obtained every day. Mr. Domingo Ramirez, a driller, built this well on his own ranch near Benavides, Texas.

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NOTICE TO MICHIGAN DRILLERS

Andrew J. Mozola, Instructor of Geology, Wayne University, Detroit, Michigan, is making a study of ground water conditions in Oakland County as a research project leading to a degree.

To complete his study he has asked that drillers in this area furnish him with logs of wells in Oakland County.

They may be mailed to the Geology Dept., Wayne University and will be acknowledged in his thesis as a source of information.

Moe—"What do you think of anyone that sleeps with his shoes on?"

Joe—"That's silly. Who would sleep with his shoes on?"

Moe—"My uncle's horse."

Irritated Father—"Doctor, can you come right over? Our little boy has swallowed my fountain pen."

Doctor—"That's serious. What are you doing in the meantime?"

Father—"Using my pencil."

Son—"Why do they call it puppy love?"

Grouchy Father—"Because it is a prelude to a dog's life."

—California Engineer.

SURFACE and GROUND WATER CONDITIONS

The December, 1949, report of the U. S. Geological Survey says, "the serious New York City water supply situation was not alleviated during December. A great increase in water use during recent years combined with a moderate drought produced a severe shortage in the nation's largest city."

In other parts of the country, deficient stream flow persisted in the coastal region from Massachusetts to New Jersey, and ground water levels on eastern Long Island continued to decline.

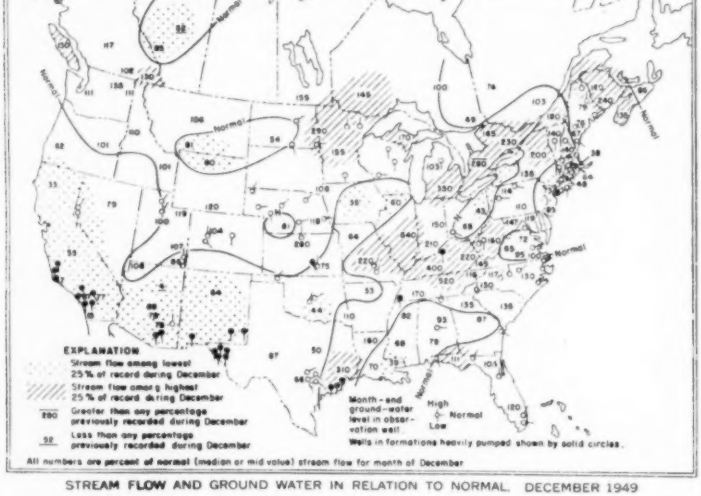
Stream flow increased generally over a broad area from the Maritime Provinces through New England to the Great Lakes region. Some areas of below normal runoff persisted, but the excessive runoff was widespread in other areas as a result of moderate rains and high temperatures that produced some snow melt. In the West, stream flow was mostly near or below normal. Storage reserves are generally satisfactory except in Nevada.

Although the water table in the three eastern counties on Long Island was at record high levels early in the year, water levels declined so rapidly and persistently during the last seven months of the year that by December the water table in nearly all sections of these three counties was lowered to about normal levels. This resulted from appreciable deficiencies in rainfall which amounted to nearly 10 inches in the last 7 months of the year, and also from extremely heavy pumpage during the year, especially during the summer drought.

In the South stream flow and ground water levels were above normal throughout much of the area, particularly in the mountains, owing largely to carryover. In southeastern Florida ground water levels during the month of December ranged from declines of 1.5 feet in the Peters area to increases of 2.2 feet in the Fort Lauderdale area. This wide variation of water level changes was the result of heavy localized rainfall. Water levels are higher than a year ago.

In the West stream flow was near or below normal, although flow of several British Columbia streams was excessive. Preliminary reports indicate that the mountain snow cover is normal in Utah and below normal in one area in Montana.

In Indiana the changes in water levels in observation wells showed no consistent trend during November. In Michigan the November, 1949, report stated that the month's average ground water stage of 0.93 foot was the lowest on record, however, the December report stated that mid-December measurements of 44 shallow wells in the north-central part of the Southern Peninsula of Michigan show a partial recovery from the record breaking low stages of November, 1949.


EXPLANATION
Stream flow among lowest 25% of record during December
Stream flow among highest 25% of record during December
Greater than any percentage previously recorded during December
Less than any percentage previously recorded during December
Month-end ground-water level in observation well
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.
All numbers are percent of normal (median or mid value) stream flow for month of December

STREAM FLOW AND GROUND WATER IN RELATION TO NORMAL, DECEMBER 1949

U.S.G.S. Map

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PROTECTION OF GROUND WATER SUPPLIES

EDITOR'S NOTE:

For a number of years we have been watching a development in the field of ground water that we feel should be of vital concern and interest to well drillers, engineers, and others engaged in the development, use and conservation of ground water.

We refer to a general awakening of the part of well users and public officials as to the importance and necessity of dependable sanitary ground water supplies. This has led to a number of regulatory and supervisory laws being passed having to do with licensing of well drillers, the adoption of well drilling codes, the construction of sanitary wells and the conservation of ground water.

In order that our readers may keep abreast of these developments, we intend to publish a number of these measures, some of which are now on the statutes and others that have been proposed. We feel that drillers should know about these things and be prepared to present their side of the case whenever such measures are up for consideration in their respective states.

All articles pertaining to these subjects will appear under the heading used for this article, so as to be sure our readers know what is going on.

WE WISH IT DEFINITELY UNDERSTOOD THAT IN REPORTING THE FACTS WE ARE NOT PASSING JUDGMENT ON THE MERITS OR NECESSITY OF ANY LEGISLATION NOW IN EFFECT OR THAT MAY BE PROPOSED LATER.

MICHIGAN LOOKS AHEAD

As far back as 1869 when the legislature of the State of Michigan passed an act "to authorize the formation of companies for the introduction of water in the towns, cities, and villages," this state has been aware of and conversant with its water problems, both surface and underground. Since that time the state has made an enormous growth industrially requiring the development and use of enormous quantities of water.

Fortunately Michigan has ample supplies of both ground and surface water; however, the hydrologists in the Conservation Department are constantly studying the problems of supply and demand for more water. According to Norman Billings, Hydrologist, "the ground water situation in Michigan as in other industrial states throughout

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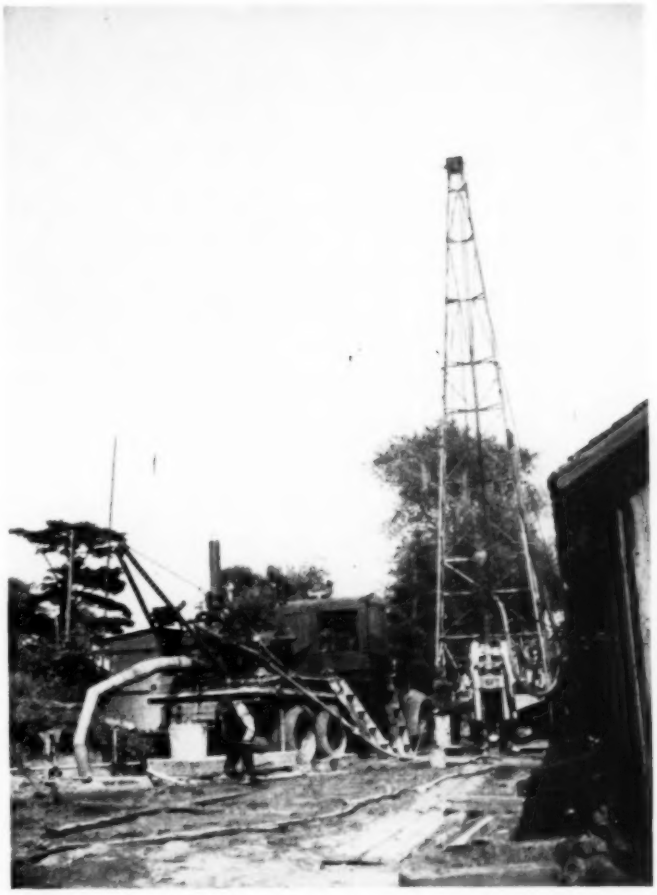
the northwest is one of recently and rapidly developing problems. Although Michigan has extensive ground water resources, these resources are either deficient or difficult to develop in the most highly industrialized areas. Extensive cooperative investigations have been made with the State and U. S. Geological Surveys which indicate a state-wide network of buried preglacial and interglacial channels. Each of these sources is being carefully studied and appraised for both present and future use."

Mr. Billings, who has made an exhaustive study of the ground water conditions in Michigan, says the greatest need is the recognition by well drillers and the public that modern well drilling and ground water development are technical problems requiring the application and use of scientific methods similar to those used in the production of oil, the construction of highways, or the manufacture of automobiles. To make such developments possible, considerable hydrologic and geologic data must be assembled and correlated. To do this, legislation is necessary, first to create the state agencies charged with the duty of collecting and interpreting the data, and secondly, with general supervision over the development and use of water resources. This usually involves legislation requiring the truthful reporting of all drilling operations. In many states the adoption of some sort of code or regulations governing well drillers and well drilling is used. In Michigan a bill was introduced into the legislature in 1947 providing for the protection and conservation of the water resources of the state by creating a water resources commission to control the use of ground water, floods, the construction of dams, the stabilization of inland lake levels, to make water resource investigations, in co-operation with other state agencies, and the federal government, to license water well drillers, to provide for establishment of flood control zones, etc. This commission was not created at that time, but a similar work is being carried out by the Department of Conservation who are actively at work and in touch with all problems involving the use of water. According to their investigations tremendous amounts of ground water are available in Michigan; but to use these supplies to the best advantage, it is necessary for industries or municipalities planning expansions or additional water supplies to locate their developments with care, otherwise they may be disappointed. In fact, water supply from the sources that are available is now an engineering problem that should be considered along with the preliminary plans before any final plans are made. Most industries in Michigan are aware of this and use the facilities and technicians in the Department of Conservation to the fullest advantage.



This is a Failing Holemaster rotary rig used by the American Drilling Company at Freehold, New Jersey to put down a deep hole 20-inches in diameter. The finished well was gravel treated and produced 500 g.p.m. from 22 feet of 8-inch Johnson Screen.

Making love is like making an apple pie. All you need is some crust and a lot of applesauce.

A musician married a terribly ugly woman for her money. When a friend asked him why he took her everywhere he went he replied. "That's easier than kissing her good-by."

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE: New Model C Fort Worth Spudder; 45 ft. steel box type mast; will handle 3,500 lbs. tools to five or six hundred feet; tools from 6" to 20"; new L.A.E. Case engine mounted on rig. Write: W. D. Jones, Route 3, Hereford, Texas.

FOR SALE: No. 71 Speed Star drilled three wells; 40 ft. mast casing reel; cat heads; ball bearing sand reel; mounted on K-7 International truck; complete set tools, 10-8-6-5; light plant; some 6⅝" No. 8 casing; new 2-ton Ford truck with winch and oil field bed. Write or phone: Paul Pierson, Longton, Kans.

FOR SALE: No. 71 Star, No. 240 Star, 22W Bucyrus Erie Rigs, complete with tools and trucks; 4 gas driven welders; turbine test pump; 500 g.p.m. 150' setting. Factory made trailer for 71 or 240 Star. Write: G. Foster, Eldridge, Calif.

FOR SALE: Three sets heavy duty cast steel tool wrenches for 4-inch square for use with jack; $40.00 per set f.o.b. Raleigh, North Carolina. Write: Heater Well Company, Inc., 306 S. Salisbury Street, Raleigh, North Carolina.

FOR SALE: 71 Speed Star Drilling Machine mounted on late model truck, including lines, tools, light plant, water tank on trailer; all ready to go; this machine is practically new; will sell complete outfit for $5,500.00. Write: D. M. LinAcome, Moran, Kans., Phone 5F3.

FOR SALE: Two 21-W Bucyrus-Erie drills complete with drilling tools for 5⅝ inch holes, cables, forge and mounted on 1939 1½ Int. and 1941 Chevrolet; one drill was bought new January 1, 1949, and the other October 25, 1948. Good first class equipment. Priced complete with tools and truck, $3,200.00 and $3,600.00. Also have two other 21-W for sale reasonable. Write: Dee Linn, Clinton, Arkansas.

FOR SALE: New double jetting pumps, 4-inch. Drill bits, swivel, head and hose. Write: Bob Evans, Route 2, Stevensville, Montana.

FOR SALE: Well drill, 300 ft. cable, practically new; dry tools, 2 drilling bars, bits, bailer, drive clamp, and chain wrenches; $550.00 or best offer takes it. Write: Department of Indian Affairs, W. J. D. Kerley, Agent, Broadview, Sask., Canada.

FOR SALE: A new Cam-Sal all steel well drilling rig; never used; 165 ft. ⅜" drilling line; 150' ¼" sand line and one 3"x5½' stem with inserted bits in head; size 4" and 5⅝"; one 3"x5' bailer and one 4"x7' bailer; and drive clamps bar; 4"x5⅝" casing double V-belt drive on hoist; drum will spool 300' ⅜" wire rope; this machine is 8 feet long and is used for drilling in cellars and barns where light is inserted; also can be used for testing coal and other minerals; price $325.00, cost $450.00. Write Charles Kennedy, Route 4, St. Clairsville, Ohio or phone 439R2.

A double drum rotary rig for water well use built by Wichtex Machinery Company of Wichita Falls, Texas.

FOR SALE: 2 Keystones, 1 No. 3 with Waukesha power unit; 1 No. 1 with all No. 3 gears and as heavy as No. 3, with Chrysler power unit; 1 custom built all steel equivalent in power to 22W. All three have shock in top of derrick; will sell mounted or unmounted. Priced cheap to sell; reason for selling, expect to replace with new 22W's at 4 times the cost of these. Write: D. C. Magette, Courtland, Virginia, phone 2291.

FOR SALE: Drilling tools for 6" hole; drive clamp; one 4"x12' drill stem; two 150 lb. 6" drill bits; one set drill jars, never been used; two cast steel tool wrenches; one tool tightener; one 4"x10' dart valve bailer;. one 2½"x12' jar bumper; swivel eye; one swivel neck rope socket less mandrel; tool joints 2x3; made by Bucyrus and in new condition. Write: W. G. Law, Troy, Alabama.

FOR SALE: Sanderson-Cyclone wood frame truck mounted drilling machine without tools, very cheap. Write, Abe Fasnacht, 108 Hazlett Ave. N. W., Canton, Ohio.

WANTED: Would like to trade my farm land for Failing Rotary 750 Signo drill with equipment, all the tools, and drill pipe up to 700 feet. Write: Steve Rutar, Bruce, Alberta, Canada.

WANTED TO BUY: Band wheel rig that will handle from 4-inch to 8-inch tools. Write: B. W. c/o Edward E. Johnson, Inc., 2304 Long Avenue, St. Paul 4, Minnesota, furnishing all details regarding tools, mounting, etc.

FOR SALE: Failing 1,500-ft. capacity drill, complete, bits, drill rod, tools, etc. Also Sullivan rotary 1,000-ft. capacity, complete, both now on water wells in vicinity of Bell Fourche, South Dakota. Write: Fred E. Butler, 1013 So. Cedar, Casper, Wyoming.

FOR SALE: Model 50, Keystone Drilling Machine, 14 months old, first-class shape, working every day. Machine mounted on 10-wheel Army GMC truck, '48 motor, rebuilt; with or without tools. Best offer. Reason for selling, bad health. Write: F. B. Rogers, Jessup, Maryland, phone Waterloo 483W1.

FOR SALE: 3½ Keystone truck, mounted, 4 and 6-in. tools. Just completely overhauled. Write: L. B. Leverich, Route 2, Edgerton, Ohio.

FOR SALE: All steel Howell 160 Model drill, A-1 condition, rebuilt drill and motor, 34-foot derrick; Ideco rubber shock in top of mask; 400 feet ⅝-in. cable, 500 feet ⅜-in. cable, 1 set of 6-in. tools on 1933 3-ton International truck, fair condition. Price $2,200.00. Also two No. 3 Wood Keystone drills, 1 on 1933 C-40 International truck; cable line, spring shock in derrick, fair condition; 6-in. tools, clutch gear hoist on bull reel, price $900.00; One Keystone drill on 1929 Indiana truck, fair condition, friction hoist, rope, with 6-in. tools, price $500.00. Write: Harry Green, Damascus, Maryland.

BUSINESS FOR SALE: In one location for over twenty-five years. Well and pump business. All equipment in first-class shape; 3" to 8" wells; plenty of tools, etc. to make up a complete well and pump service. Shop is 32x65, is built of cement blocks; seven room house, modern. Will take $5,000.00 for the down payment. No interest on the balance. Write: R. C. Hessler, 452 W. Shadbolt Street, Lake Orion, Michigan.

WANTED: Experienced well driller in midwestern state. Write: Box C, c/o Edward E. Johnson, Inc., 2304 Long Ave., St. Paul 4, Minnesota.

WANTED: Complete Rotary drilling sets for drilling water wells 4", 6", 8", 10", 12" and 14" diameters, depths up to 500 ft. Quote full descriptions of plants offered together with working capacity in normal strata with each size of bit, etc. Contact M/s Shree Ram Dass & Bros, 7/81 Tilaknagar, Kanpur (U.P.) India.

FOR SALE: One 33-W Bucyrus Erie, one combination rotary and jetting machine for 2" to 4" well mounted on a two-wheel trailer. Write: Nick Rapp Box 311, Summerville, South Carolina.

A politician is an individual who still kisses the same babies he kissed 20 years ago.

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul, Minnesota.

NEBRASKA MEETING

The annual convention of the Nebraska Well Drillers Association will be held at Nebraska Hall, University of Nebraska, Lincoln, on February 23 and 24.

The jobbers and manufacturers participating will furnish the "Dutch" feed on Thursday, February 23. Space for exhibits will be furnished at the University.

The usual program of topics of interest to the drillers of the state is being prepared under the direction of George S. Brinton, Chairman.

FLORIDA MEETING

The 10th annual convention of this association will be held at the LaMarr Hotel in Orlando on March 31, April 1 and 2. Arrangements are being made for exhibits and displays. A full program of talks and entertainment for the three days is also being prepared for the benefit of those in attendance. Further details can be secured from Clyde Freeman, Convention Chairman, Box 2927, Orlando.

MINNESOTA MEETING

This association will hold its annual meeting at the Nicollet Hotel in Minneapolis, March 15, 16, and 17. The usual program of speakers and entertainment is being prepared and ample space will be available for manufacturers and jobbers wishing to display their products.

Detailed information as to the arrangements can be secured from the Secretary, Al A. Zuercher, Route 7, St. Paul, or the President, Ed Renner, 5800 Goodrich Avenue, Minneapolis 16, Minnesota.

MONTANA MEETING

The Montana Drillers Association will hold its annual meeting at the Civic Center in Lewiston, April 3 and 4.

Programs for the meeting are being prepared which will be of interest to all drillers attending, according to Loren E. Anderson, Secretary-Treasurer, 828 Broadwater Avenue, Billings, Montana.

TEXAS MEETING

The Texas Water Well Drilling Contractors Association held its annual meeting at Houston, December 1, 1949.

In spite of bad weather, sixty-four members were present to enjoy a steak dinner.

The annual election of officers resulted in O. F. Jensen being elected President, B. J. Swinehart, Vice-President, and George Ringstaff, Secretary and Treasurer.

A monthly meeting of the association will be held on or about January 31 for further discussion of interest to well drillers. The Secretary's address is P. O. Box 11239, Houston, Texas.

MICHIGAN MEETING

Plans are now under way for the annual state convention of the Michigan Well Drillers Association, which will be held at the Armory Building in Lansing, June 20 and 21, with a meeting of the Board of Directors at the Olds Hotel the following day.

Exhibitors will have ample space to display their equipment but are expected to move in June 19.

During recent months the locals at Jackson, Lansing, and Saginaw have held meetings and the Pontiac local expects to hold a meeting before the convention.

Harold Armstrong, Secretary-Treasurer, is in charge of arrangements with the aid of Mrs. Armstrong. He can be reached at 484 Capital Ave. S.W., Battle Creek, Michigan.

WISCONSIN MEETING

The 1950 meeting of Wisconsin Well Drillers, Inc., will be held at the Northland Hotel in Green Bay, May 19 and 20. Convention details are in the hands of R. H. Nienow, Secretary-Counsel, Merrill, Wisconsin.

NEVADA MEETING

Alfred M. Smith, State Engineer of Nevada, recently called a meeting at the State Capitol Building in Carson City for the purpose of interesting the water well drillers of the state into forming an organization for the purpose of "promoting the interests of the drilling industry and raising the standards and scientific techniques of water well drilling."

Twenty-two drilling contractors were present and a committee was appointed to form a constitution and set up by-laws for the new association. William S. Wright of Dyer is Chairman. They were to

(Continued on Page 14)

Here William C. Selmer and son, William, Jr., are drilling a 6-inch well for radio station WKOW at Madison, Wisconsin. After considerable trouble getting his casing down through boulders and rock, Mr. Selmer installed a Johnson Screen and brought in a good well for his customer.

ASS'N NEWS---Cont'd.

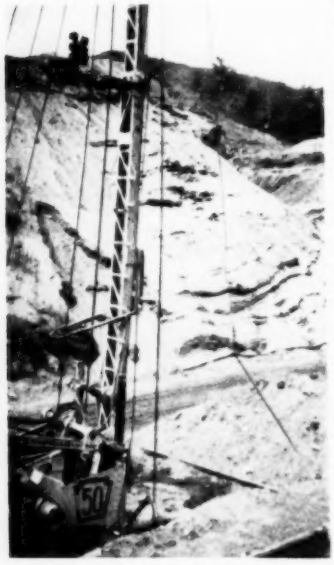
(Continued from Page 13)

report at a second meeting to be held at Tonopah in November, 1950. It is hoped to have all of the seventy-five licensed drillers in the state as members.

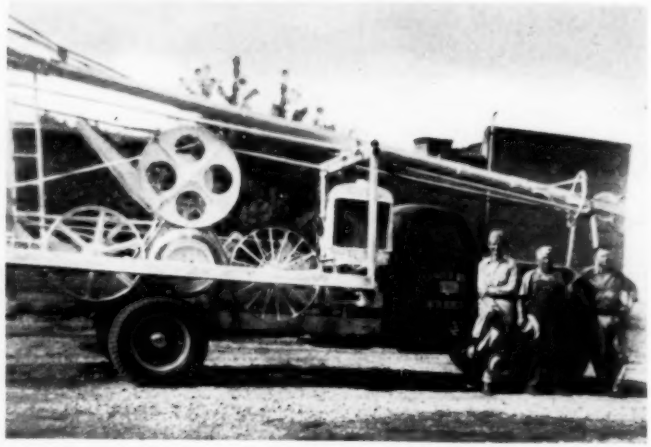
IOWA MEETING

The 21st annual meeting of the Iowa Drillers Association will be held at the Hotel Warden in Fort Dodge, February 15, 16, and 17.

An interesting technical program has been planned as well as lots of entertainment (particularly for the ladies). The annual banquet will be followed by a dance following the precedent established at last year's convention. The usual prize drawing will be held the night of the smoker. Travis C. Parker, Secretary, assisted by Mary, will be on hand to receive the drillers and dues. He can be reached for details at West Branch.



The Twin State Gravel Well Corporation in Vermont get into all sorts of drilling as the picture shows one of their outfits putting down one of nine 6-inch observation holes for a government flood control dam.



A well drilling rig made by Isaac Steinhoff of Florence, Kansas, being delivered to Arnold Riffel, a driller at Lincolnville, Kansas.

MISSOURI MEETING

Missouri drillers will hold their 14th annual meeting at the Missouri Geological Survey Building in Rolla on April 17 and 18.

Outdoor space will be available for those wishing to display drilling equipment, also space indoors for exhibits and displays.

The program of the meeting will be available to all drillers in Missouri about two weeks before the meeting so that everyone will know about the meeting. The annual banquet will be held on Monday evening, April 17, with adjournment during the afternoon of the 18th.

Mr. Robert P. McNeal, Service Secretary, is in charge of all arrangements, Box 250, Rolla, Missouri.

ILLINOIS MEETING

The 23rd annual convention of the Illinois Association will be held at the Leland Hotel, Springfield, Illinois, on February 2, 3, and 4, with technical sessions starting on the afternoon of the 3rd, followed by the annual banquet and entertainment in the evening.

Space will be available for exhibits and displays indoors. Richard F. Fisher, Executive Secretary, Natural Resources Building, Urbana, has handled the arrangements.

NEW YORK MEETING

The annual meeting of the Empire State Water Well Drillers' Association was held at the Hotel Utica, Utica, New York, on January 11, 1950, at 2 p.m. This meeting was attended by fifty members, their wives and guests.

Election of officers was the highlight of the meeting. Mr. Fred Merrill, Liverpool, New York, was re-elected President; Ray S. Knapp, Lancaster, re-elected Vice-President; and Robert Klindt, Morris, was elected Secretary-Treasurer. Hugh McLean, Germantown, was elected Director, three years. Other members of the Board of Directors are: Marvin W. Wendt, Sanborn, and Mr. John Montague, Utica.

The next quarterly meeting will be held at White Plains on April 19, 1950. Place of meeting is to be announced as soon as arrangements are made.

The association will hold its second biennnial exposition in Syracuse, New York, on July 13, 14, and 15, at the Genesee St. Armory with headquarters at the Hotel Syracuse. The present plans call for display booths with electricity available. The details of the program are being worked out and will be available later. Ray S. Knapp, Lancaster, is Chairman of the Exposition, and Robert Klindt, Morris, New York, is Secretary-Treasurer of the Association.

OHIO MEETING

At a regular meeting of the Ohio

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Well Drillers Association held in the State Office Building in Columbus, December 17, 1949, E. D. Allen, Secretary, reported on the recent meeting of N.W.W.A.

Election of officers for 1950, the convention program, advertising program, together with entertainment provided a day full of activity.

This association is making a determined effort to improve the standard of drilling in Ohio, both by legislation and co-operative efforts of their members. They expect to inform the public of their efforts and services by means of an advertising program calling attention to the benefits of modern well drilling.

NORTH CAROLINA MEETING

The Board of Directors of the North Carolina Association has divided the state into two districts with district governors to supervise the activities of their districts.

R. O. Heater of the Heater Well Company, Raleigh, is governor of the eastern district and Ned Smalley of Hickory, governor of the western district. Each governor will arrange for a meeting in his district to get the drillers together, to get acquainted with each other, and discuss the aims and purposes of the association.

Rotary rig used by W. D. Jones of Hereford, Texas, to put down irrigation wells in the Panhandle area.

This is a 2,365-foot gravel treated well recently completed for the City of Houston, Texas, by Texas Water Wells, Inc. It is the deepest and largest producer ever drilled for the city, having a capacity of 2,565 gallons per minute.

The annual meeting for 1950 will be held at Charlotte, September 22 and 23. Complete details of this meeting will be available after the program has been worked out.

KANSAS MEETING

The Kansas Water Well Drillers Association has planned the following meetings for 1950: Regional meetings at Chanute, February 25, Garden City (picnic) April 30, and Lawrence, July 8. The annual meeting will be held at Great Bend on October 13 and 14. One of the items for early discussion will be the effect of a proposed licensing law on Kansas drillers and on the water well industry. Mr. A. R. Leonard, Service Secretary of the Association, 111 Lindley Hall, University of Kansas, Lawrence, will be glad to furnish details regarding any of these meetings.

NORTH DAKOTA MEETING

The North Dakota Association held its annual meeting at the Patterson Hotel in Bismarck, December 5, 6, and 7. This is the oldest well drilling association, according to their program, and is a lively, active association.

Among the speakers appearing during the meeting were Dr. Wilson M. Laird, State Geologist, William Gahr of the State Department of Health, Col. William Hall of the Corps of Engineers, U. S. Army, Fred J. Frederickson of the Greater North Dakota Association, and others, all of whom contributed a lot to the meeting. In addition there was much open discussion of dues, licenses, fees for rigs on trucks, registration of drillers, etc.

The annual banquet held on Tuesday, December 6, was well attended as over 100 persons enjoyed the evening together. Bismarck was selected as the meeting place for 1950, the meeting to be held July 24, 25, and 26.

The present officers were re-elected for 1950 with K. J. Thompson, Paul Jaszkowiak and Dan Krenelka as Directors.

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NOTICE

We still have a few copies of our book "Ground Water—Its Development, Uses, and Conservation," though the supply will not last much longer. If you have not purchased your copy, please send $2.25 to cover the cost of printing and mailing, and your book will be sent to you at once.

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